# ****Research Proposal: Effective Uses of Technology for Students with Autism****

## ****Researched by: Bethany Stiefel****

**Overview/Introduction:**

Technology in the classroom is one of the biggest "hot button" topics in the field of education today. The growing number of children diagnosed with autism is one of the biggest "hot button" topics in the medical field lately. To benefit self-contained special education classrooms educators, inclusion educators, and general educators who serve students with autism, the research will take place where these two topics intersect. With a growing population of children diagnosed with autism, consequently, a growing population of autistic students in the classroom, there is a need for technology in the classroom to support these students. Due to this need, the chosen research topic involves effective uses of technology for students with autism. Johnson and Christiansen (2008) discuss the learning process, stating that we learn by using our senses of sight, hearing, taste, smell, and touch.

Based on what I have learned from my experience in working with these students, and attending autism professional development trainings, I realize that students with autism struggle with learning by using their five senses. For students with autism, certain senses may be heightened to the point of being unbearable due to overstimulation, whereas other senses may be lacking. The sensory input deficit autistic children suffer from causes them to learn differently than their peers. Assistive technology (AT) devices have been in place for students with special needs including students with autism, for years. Although some AT is already available, many of the devices available to students with special needs enrolled in public education are quickly becoming obsolete. It seems that using the latest technological advances to enhance the learning of students with special needs is overlooked in the public school system. I am interested in using mainstream, cutting edge technology to help students with autism in the academic and the functional curriculum. My plan is to give information that will enable teachers of autistic students to be provided with sufficient training on strategies to use with the latest technology to significantly increase the achievement of autistic students in functional and academic settings. Due to this plan, my research will focus on strategies for effectively integrating technology into the special education classroom and the effective uses of technology for students with autism.

**Literature Review:**

Today’s culture is infused with rapid evolutions of technological enhancements. Technology is used in so many different facets of life that it has evolved from a luxury to a necessity (Gill, Mineo, Salkin, & Ziegler, 2008). With this evolution, the need for creating technology rich environments by which students will learn has emerged. In spite of economic struggles, there is still an obligation to provide teachers and students with the tools they need to be successful. Students with special needs, particularly students with autism, are no exception. Too often, students with disabilities, such as autism, are overlooked when it comes to using technology to enhance their educational programs. Teachers of such students have a clear focus of helping them become as independent as possible. In a world where technological literacy is a demand for citizens to successfully engage in day to day living, the independence of students with autism is hinged on their technology exposure in the classroom (Cheng, McGrath, Moore, & Powell, 2005). Many developments such as web 2.0 have transpired to offer students a more interactive technologically enhanced educational experience. Although these developments are on the right path to providing a more individualized technology experience for students with autism, teachers need to know how they can manipulate available technologies to make them appropriate for students with autism to be successful.

Computers have been in classrooms for the last twenty years or more. Their presence, however, has become increasingly common in classrooms over the past decade. Their use in the classroom has been shifted to the forefront of instruction making them a most essential tool in education today (Farr & Jacklin, 2005). Computers are now being used for everything from taking attendance to providing students with interactive individual study programs. There are many ways computers can be used to improve the school experiences of students with autism. Stromer, Kimball, Kinney, and Taylor (2006) conducted research on how to use computers to provide autistic students with activity schedules. Studies have also been conducted to determine student engagement with electronic screen media among students with autism (Gill, Mineo, Salkin, & Ziegler, 2008). Collaborative virtual environments (Cheng, McGrath, Moore, & Powell, 2005), video modeling (Ayers & Langone, 2007), word processing (Broun, 2009), and computer presented social stories (Powell-Smith & Sansoti, 2008), have all been the focus of research studies concerning how to enhance social interaction (Farr & Jacklin, 2005), and task completion (Cronin, Gast, & Mechling, 2006) for students with autism using the computer. With so many studies on using the computer to aid students’ social interaction and task completion, students’ ability of *watching* something on a monitor is a big part of the engagement (Gill, Mineo, Salkin, & Ziegler, 2008). Given the research that has been done in the past, it is important to take a step further by finding ways to make using the computer in the classroom a more interactive experience for students with autism.

Many studies used qualitative data, anecdotal records, and teacher observations of student behaviors as their approach to data collection. Web surveys were also a popular method of data collection to gain teacher insight to how an intervention worked in the special education classroom. A mixed approach of quantitative data (numerical statistics) and qualitative data (descriptions and observations) seems to be the most appropriate approach to determine whether specific interactive programs are effective in the classroom for students with autism. In *The Computer in the Classroom: A Medium for Enhancing Social Interaction with Young People with Autistic Spectrum Disorders* (2005), behavior checklists were used for case studies that were conducted with three autistic adolescent males. The behavior checklist with cited positive and negative behaviors such as hand flapping, rocking, yelling, or screaming seemed to be a most beneficial tool to determine student engagement. The checklist would have to be completed by an adult familiar with the students’ particular stereotypies to determine whether the behavior could be interpreted as positive or negative. *Collaborative Virtual Environment Technology for People with Autism* (Cheng, McGrath, Moore, & Powell, 2005) yielded great promise for interaction rich, computer-based activities in which students with autism may participate. Using *Second Life* software (2005) students have an avatar in which they communicate on computer-based content with co-avatars. Although this software demonstrates no face-to-face interaction time, it helps students with autism build the necessary social skills for real-life situation without the possible anxiety actually being face-to-face with a real person. Virtual reality software allows teachers to differentiate instruction (Stroud, 2010) to suit students’ needs. This is a great method to enhance autistic students’ communication skills due to the variation in each student’s ability level.

A mixed approach of qualitative and quantitative will allow the research to show trends that will determine the best approaches to use for students with autism of different age groups, as well as see how technology affects a broad spectrum of stereotypies and sensory issues. Due to the bulk of the data collection being conducted in the special education classroom, it will be collected while students are working toward development of social, academic, and functional skills. In *Comparison of Static Picture and Video Prompting on the Performance of Cooking-Related Tasks by Students with Autism* (Gustafson & Mechling, 2008), instructors collected data on each student’s ability to perform each cooking-related task and was reported based on the percentage of tasks performed correctly by each student using pictures or video prompts. In this circumstance, quantitative data is appropriate to show the percentage, while a qualitative observation would allow the instructor to see the difference in how the task was performed. This mixed approach is also an appropriate method of data collection when evaluating autistic students’ engagement while using computers.

The data collected from the research will be analyzed to determine what computer programs or tools can be used to boost engagement for students with autism, as well as improve important life skills. The data will help determine different approaches to use when teaching a specific set of skills while also allowing the students to meet their needs to be able to perform functional skills using technology on a day-to-day basis. Students with autism find technology intrinsically motivating (Broun, 2009) and this research will allow this motivation cannot be channeled into educational activities that will help them flourish as independent individuals.

**Problem Statement:**

Due to the sensory overload often experienced by students with autism, it is difficult for students to differentiate between important and unimportant stimuli. A problem special education and general education teachers face concerning students with autism involves keeping the student's attention. *Engagement with Electronic Screen Media among Students with Autism Spectrum Disorders* (Gill, Mineo, Salkin, & Ziegler, 2009) focused on electronic screen media and engagement among students with autism, *The Computer in the Classroom: A Medium for Enhancing Social Interaction with Young People with Autistic Spectrum Disorders?* (2005) focused on whether computers enhanced social interaction. Based on what was derived from these articles, the article focuses will be combined by finding out if computers help promote engagement among students with autism with deterring social interaction. A point of interest is the impact on electronic screen media in helping students with autism focus on important stimuli due to the limited view of the screen. A point of concern, however, is whether or not autistic student would focus so intently on the computer that the information begins to lose relevance. The research will delve a bit further than what the cited articles’ focus to determine if engagement is increased by using computers and if so, what strategies can be used to reap positive impacts on behavior as well as academics.  
  
How can technology be used in the special education classroom to help students with autism better develop academic, social, and functional skills?

**Research Methods:**

Based on the above problem statement, how can technology be used in the special education classroom to help students with autism better develop academic, social, and functional skills, a mixed approach will be needed for data collection. To collect quantitative data, pretests and post tests will be used along with teacher commentary of student behaviors while using technology. A student behavior observation form will also be used in the assessment process to determine student engagement while using technology in the classroom. This will allow the researcher to observe how the technology will be used to keep the students' attention for the duration of the activity or lesson. Ten trial data sheets will also be used to document the percent correct on activities for technology related activities. This will help determine if using technology in this way helps students improve with the goals they have set. In addition to this quantitative data collection, qualitative data will also be used in the form of an online survey completed by special education teachers in the school system. This will allow the researcher to gain needed input for the data collection process. It will also make the survey easily accessible to teachers. Accessibility will help the data collection process to be completed more efficiently and encourage participation. Using quantitative and qualitative data will help the researcher determine the best approaches for students with autism at different levels of development. A mixed data approach will also reveal how technology affects a broad spectrum of stereotypies and sensory issues. While most of the data will be collected in the classroom, it will be collected while students are working toward development of social, academic, and functional skills.

**Types of Data:**

To collect qualitative data, interviews of special education teachers will take place along with digital surveys they educators will be asked to complete. To collect quantitative data, a pre/post test format will be used along with teacher commentary of student behaviors while using technology. Using both types of data will help the researcher determine the best approaches to use for students with autism of different age groups as well as a broad spectrum of stereotipies and sensory issues. While most of the data will be collected in the classroom, it will be collected while students are working toward development of social, academic, and functional skills.

**Data Collection Strategy & Instrumentation:**

Determining the best method of data collection to sufficiently answer the research question was a bit of a struggle. *Using Computer-Presented Social Stories and Video Models to Increase the Social Communication Skills of Children With High-Functioning Autism Spectrum Disorders* used baseline, intervention, and final data to show how students were affected by technology use in the classroom (Sansosti & Powell-Smith, 2008). At first, it seemed that a pretest/posttest format would be the best option, but after the review of several articles, it seems that to best determine the how computer-based instruction impacts students with autism would be to use a baseline, intervention, and final data model as mentioned in the above article. The compilation of baseline, intervention, and final data, along with collecting data of non-disabled peers to use for comparison will help the researcher determine how technology-based instruction will help students with autism. A student behavior observation form will be used to record students’ are reactions to using technology in the classroom. This will help the researcher determine students' level of engagement. To show how technology is affecting engagement though, the researcher will need to also take data on students' behavior during instructional activities that are not technology infused.

**Data Analysis:**

Based on the data that will be collected using baseline, intervention, and final data that will be used to show how students are affected by technology use in the classroom, the researcher will analyze the data based on each individual student's ability. Students will be evaluated before they were introduced to the technology, at the time of introduction, and a final administration when the student exhibits proficient use of the technology.  
Since there will be no similar class available for comparison to use as a control group, the researcher will analyze data from non-disabled peers who also use technology in the classroom. This will give the researcher some means of comparison to help determine how technology-based instruction will help students with autism.

The behavioral checklist will be used to analyze student reactions to the use of technology for behaviors that imply excitement, boredom, interest, confusion, etc. to determine student level of engagement. For the sake of comparison, the researcher will also analyze data on student behavior during instructional activities that are not technology infused.

All data will be placed directly into an Excel Spreadsheet for analysis. Line graphs will be made of the baseline, intervention, and final data to show student growth in the use of technology along with other trends. A bar graph will be created to show the trends and most popular answers in the teacher survey. The student behavior observation form will be turned in for research purposes but will be used mainly to help teachers in determining student engagement and thus help them in answering the survey questions.

**Timeline:**

Preparation for this research will begin two weeks before the actual study takes place. A list of interactive websites will be compiled and reviewed for use during the study. Virtual reality programs will be submitted to the school administration for approval and purchased with special education funds. Specific activities and video prompts will be created during the two week prep period. The effective uses of technology for students with autism research plan will take place over a nine week period using the methods described throughout the plan. Two weeks will be allotted for data analysis. The entire process will be completed over a series of 13 weeks.

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| **Phase** | **Process** | **Time** |
| Phase 1 | Planning | 2 weeks |
| Phase 2 | Conduct Research | 9 weeks |
| Phase 3 | Data Analysis | 2 weeks |

**Appendix A:**

**Computer-Based Instruction Survey for Teachers of Students with Autism**

Please use this survey to provide feedback on computer-based instruction in your classroom.

\*Required

**How often do you use computer-based instruction in your classroom?\***

( ) Never, I do not have sufficient technology access

( ) Once a week

( ) Twice a week

( ) Three times a week

( ) Four times a week

( ) As much as I can!

( ) Other

**Is there an opportunity for each child in your class to access a computer on a daily basis?\***

( ) Yes

( ) No

**What types of computer-based activities do you use most with your students?\***

Check all that apply.

( ) Videos

( ) Study games

( ) Word processing

( ) Basic computer literacy skills

( ) Other

**Please indicate your general thoughts on using the computer for instruction for students with autism.\***

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**Overall, do you find computer-based instruction to be successful with your students?\***

( ) Yes

( ) No

**If yes, why?**

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**If no, what would be needed to improve?**

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**Please provide additional comments:**

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**Appendix B:**

**Student Behavior Observation Form**

Please use this form to indicate student behavior during a computer-related task.

\*Required

**Please describe the activity in which the student is being asked to participate.\***

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**Does the student appear to be actively engaged?**

( ) Yes

( ) No

**If yes, what behaviors imply that the student is engaged in the activity?**

( ) Smiling

( ) Self-talk

( ) Rocking

( ) Hand flapping

( ) Light filtering

( ) Echolalia

( ) Self-stimulating behavior

( ) Other

**If no, what student behaviors are being displayed?**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Is the activity one in which the student in intrinsically motivated?**

( ) Yes

( ) No

**Please provide any other comments that would help to determine the student’s level of engagement.**

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